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Qingguo Wu

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EXAMINER

PADGETT, MARIANNE L

ART UNIT

PAPER NUMBER

1792

MAIL DATE

DELIVERY MODE

07/10/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/807,680	<b>Applicant(s)</b> WU ET AL.	
	<b>Examiner</b> MARIANNE L. PADGETT	<b>Art Unit</b> 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 4/7/2008 & 3/28/2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,3-10,12-25,27-36 and 38-40 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-10,12-25,27-36 and 38-40 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |                                                                                        |                                                                   |
|----------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>4/7/8</u> .                                                   | 6) <input type="checkbox"/> Other: _____                          |

Art Unit: 1792

1. Applicant amendment of 3/28/2008 to the specification has corrected objections thereto as set forth in section 4 of the action mailed 11/28/2007, noting that applicants confirmation of the correct meaning of the typographical error was "pinenes", was confirmed on page 10 of the 3/28/2008 response.

The IDS 04/7/2008 has been made of record, noting that duplicate &/or improper citations, analogous to those discussed last action have been crossed out.

2. Applicants' terminal disclaimer of 3/28/2008 has been approved, thus removing the obviousness double patenting rejections as set forth in sections 7 & 8 of the action mailed 11/28/2007, over patents 7,176,144 & 7,166,531.

Applicants' amendments to the claims have corrected the 112, second & first paragraph rejections as set forth section 3 of the action mailed 11/28/2008, with an additional concerns discussed below.

Applicants' explanation in the paragraph bridging pages 9-10 of the response, explaining how the prefix "bis-" requires two units of trimethyl acetylene (i.e. bis  $\equiv$  bi-, is a dimer, or the chemical it proceeds exist twice in the compound), thus clearly showing the distinction of TMSA & BTMSA.

Applicants' explanation with respect to "vacuum integrated" on page 10 of their 3/28/2008 response, in their remarks, which refers to page 14, lines 10-15 of the specification, is considered to provide adequate explanation & definition for this term, which is said to refer to including transfer or areas between chambers as also been under vacuum, as well as the individual chambers.

With respect to applicants' cited support for their amendments to the claims, the examiner notes that original claim 22 having the scope of one second-30 minutes fully encompasses the presently claimed range, thus may be considered supported in that respect, with that further noted that applicants citation of figure 4 A. & page 21, which describes this figure in the first & second paragraphs thereon does show the use/effects of the specific times of 10 seconds & 1 minute, however it is noted that these times only have any particular significance for the particular example in which they were used, which employs hydrogen plasma (not generically any plasma) to the particularly deposited precursor film of vapor deposited DMS

Art Unit: 1792

& ENB (not generically any porogen & any structure for, either encompassing any elements of the periodic table). Hence, while the particularly claimed range may be considered generally supported, it cannot be considered to provide any particular results or optimization to the present scope of the claims, i.e. generic deposition materials & generic plasma.

The examiner notes that none of thing citation to support provided by applicant appear to discuss increasing the porosity of the poorest locate dielectric film due to subsequent treatment with electron beam or UV radiation. Further see section 9 below.

3. **Claims 1, 3-10, 12-25, 27-36 & 38-40** are rejected under 35 U.S.C. **112, second** paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In independent claims 1 & 36, limitations (b), the requirement "to remove **at least** a substantial portion of the porogen..." (emphasis added) in the first chamber via a plasma, includes removing all of the porogen, thus the amendment that now requires limitations (c) or (d), respectively, "to remove additional porogen..." after being moved to the second chamber, may be considered to encompass confusing or contradictory limitations, given that part of the scope required to be included by limitations (b) will explicitly exclude the ability to perform this later step.

4. A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

Art Unit: 1792

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. **Claims 1, 3-10, 12-18, 20-21, 23-24, 27-36 & 39-40** are rejected under 35 U.S.C. **103(a)** as being unpatentable over **Lukas et al.** (2004/0096672 A1), optionally in view of **Hautala et al** (6,268,288 B1).

Applicants have amended their independent claims to include limitations as previously set forth in claims 2 or 37, 22 & 26, where the time for plasma exposure has been narrowed from the range in the dependent claim 22 & applicants have added the additional affect in the treating step to require an increase in porosity due to the second post-deposition treatment that is now required to be e-beam or UV radiation, however all of these changes may be considered encompassed or remain obvious in view of Lukas et al. (672), over which the concepts were previously rejected, as further discussed below.

**Lukas et al.** ((672); abstract; [0011-12+]; [0021-23]; [0025]) teach deposition of low dielectric materials ( $k \leq 2.7$ , more preferably about  $k \leq 2.2$ , [0069]; organosilicates glass, [0022] [0025] [0051]) by deposition of multiphasic material that may codeposit a pore-forming material (i.e. porogen, such as  $\alpha$ -terpinene; [0043] & [0078]) & a structure forming material (DEMS, TMCTS, OMCTS, TMSA; [0030] & [0078]) using deposition techniques, such as CVD, PECVD, spin coating, etc. ([0027-28] & [0032]),

Art Unit: 1792

where it is further taught to remove the pore-forming phase by exposure to at least one energy source, inclusive of UV light, electron beams, plasmas, etc ([0047]; [0053-56]; [0059-60]; [0063- 66]). It is taught that the exposure step may be performed in a variety of settings depending on the process used to form the multiphasic film, including mention of a modified deposition chamber, vacuum chamber, cluster tool, etc. ([0058]), which teaching would have reasonably suggested to one of ordinary skill in the art to employ **routine experimentation** to optimize exposure settings dependent on such factors. While the teachings of Lukas et al. (672) emphasize the use of ultraviolet light source for removal of porogen, they do specifically teach that more than one energy source, where only one need be ultraviolet may be used to perform this step, they also explicitly teach a further "treatment" step that "may be performed **before, during, or after** the exposing step" (emphasis added), that may increase the mechanical integrity of the material, by for example promoting crosslinking within the porous film, stabilizing the porous film and/or removing additional chemical species from the network, and where this second energy source includes any of the energy sources disclosed in the reference ([0059-60, especially 60]). While Lukas et al. do not specifically discuss that the porosity is increased via further exposure treatments (neither was such found in applicants' specification), it would've been obvious to one of ordinary skill in the art that removal of additional material, i.e. porogens, from the already exposed porous film would have reasonably been expected to include effects, such as increased porosity, i.e. greater percentage of void versus solid, dependent on particular materials being treated, how they were deposited & other treatment parameters, such as temperature, etc., such that when causing effects such as stabilizing the porous film & increasing mechanical strength, increased porosity it would've been expected to be an obvious optional result.

Lukas et al. note that various parameters, such as temperature, time may vary depending on the chemical species used in the multiphasic material, also with greatly varying conditions with respect to pressure, vacuum, gaseous environment used (inert e.g. nitrogen, carbon dioxide, He, Ar...; oxidizing;

Art Unit: 1792

reducing e.g. hydrogen...), pressures preferably about 1-1000 Torr, where these concepts are applied generically regardless of energy source for exposure &/or treatment ([0057-58]; [0061]).

With respect to treatments & exposures, for embodiments specifically employing plasma, specific teachings to use environment such as nitrogen, carbon dioxide, He, Ar, or hydrogen gas, at plasma powers of 0-5000 W, preferred temperature ranges from ambient-500°C, preferred pressure ranges of 10 mtorr-atmospheric pressure & preferred total treatment times of 0.01 minutes-12 hours ([0063]). The taught times for plasma exposure fully encompass applicants' claim times amended to be 10 seconds-one minute, thus are clearly covered by Lukas et al. (672), and as noted above given this reference's teachings concerning optimization of the exposure step parameters due to particular deposition process (i.e. inclusive of materials deposited, particularly techniques of deposition, apparatus employed etc., which factors are completely generic in present claims, except for having multiple chambers which is consistent with the discussed cluster tool of Lukas et al.) clearly suggest optimization, such as the routine experimentation, as discussed above, thus such optimization would not have been unexpected & especially when considered with respect to a particular time range applied to no particular materials deposited the unspecified deposition techniques, etc., which provide no context in which to consider the particular claimed range to have any necessary effects. It is noted that applicants' emphasis (page 13 of the 3/28/2008 response) on an alternative option of Lukas et al., i.e. "**and/or** removing additional chemical species from the network rather than forming pores" (emphasis added) is not considered to remove the obviousness of increasing porosity as this is clearly taught as an option, not a necessity, hence if not forming more pores is an alternative, forming more pores must also be an alternative. Furthermore, not forming **more pores**, does not mean that the porosity is not increased, since porosity is the amount of void space, not the number of pores that are used to form it.

With respect to treatments & exposures, for embodiments specifically employing UV ([0059] & [0064]) various UV wavelengths are mentioned, including using more than one wavelength within the

Art Unit: 1792

UV spectra with specific mention of  $\leq 280$  nm &  $\leq 200$  nm; temperatures of 200-250°C or ambient-500°C; power from 0-5000 W & times of 0.01 minutes-12 hours.

It is noted that while Lukas et al. (672) exemplifies a preference for use of ultraviolet light for removal of their porogens, they also exemplify a preference for using multiple energy treatments, both of which may remove porogen forming material & any of the energetic techniques used therefore may enhance mechanical strength as presently claimed. Furthermore since their teachings include orders of performing steps that include a treatment that may be plasma preformed before a UV treatment or exposure, applicants' apparent claimed sequence of steps with respect to plasma & UV, including their affects are encompassed by the teaching of Lukas et al. Also while the taught parameter ranges are not identical, they are significantly overlapping, especially considering teachings of Lukas et al. concerning parameters used being dependent on materials employed, hence it would've been obvious to one of ordinary skill in the art to be applied routine experimentation dependent on particular materials & types of energy employed for treatments/exposures, in order to optimize for particular energy sources and materials, as well as desired and results. Applicant's claims with respect to the plasma differ in claim 20 by specifying an RF frequency source, whereas Lukas et al. is generic with respect to what type of plasmas are employed, thus one of ordinary skill in the art would have been expected to employ conventional & standard plasma techniques, of which are of plasmas are a typical type, thus an obvious genre of plasmas to employ given the generic disclosure as such would have been expected to be effective in the taught process. With respect to UV radiation, while wavelengths as claimed are recited in Lukas et al., & intended to be used for removal of porogen materials, the disclosure of Lukas et al. does not explicitly say that the porogens absorb the wavelengths employed, however it would've been obvious to one of ordinary skill and competence in the art, that if one is intending to employ specific wavelengths for removal of specific materials, that it would have been necessary for the materials that are to be removed by the UV radiation to be able to be affected by that UV radiation, where the typical & generally employed



Art Unit: 1792

techniques for causing such an effect is to pick a wavelength absorbed by the material desire to be affected, i.e. removed, hence to do such would have been an obvious means to affect the taught process.

Applicants' claims differ from Lukas et al's teachings by exemplifying the formation of the precursor film comprising a porogen & a structure former to be in the same chamber in which exposure to plasma takes place, and where treating to increase mechanical strength, such as with UV or EB, is performed in a chamber which is a different chamber from the deposition/plasma chamber. Lukas et al. do not require any specific chamber construction or relationship for the multiple energy treatment steps, i.e. plasma, & UV or EB, however their suggestion of employing a modified deposition chamber, vacuum chambers, cluster tool, etc., for energy treatment(s), which would have been suggestive to one of ordinary skill in the art that the initial energy treatment employed may reasonably be expected to be performed in the same chamber as deposition occurs, dependent on particular materials & deposition plus treatment requirements. For example, given taught deposition techniques of PECVD or CVD, and the taught option of employing plasma treatments on the equivalent of the claimed precursor film, it would have been obvious to one of ordinary skill in the art to perform these techniques in the same chamber, dependent on particular manufacturing efficiencies, especially considering employed the same apparatus for consecutive steps may increased cost efficiencies due to the need to buy less equipment & if atmospheric conditions, such as pressure conditions, are relatively similar, they lack the need to change stations may say time & space, hence combining of consecutive steps would have been expected to have been made where such provides an advantage in time, cost, , etc. efficiencies, depending on which are most critical in the particular manufacturing environment, where such choices would have been expected to have been typically made by a competent managing engineer. With respect to further steps of exposure as contemplated by Lukas et al., for efficiency of mass production, they're taught use of a cluster tool is suggestive of multichamber's & where suggest vacuum is employed, typical cluster tool configurations would have been expected to include the overall apparatus employed vacuum, in such a way which would

Art Unit: 1792

have been expected to be consistent with applicants recited meaning of "vacuum integrated", hence would have been an obvious expected option in light of Lukas et al.'s above discussed disclosures.

Alternately, **Hautala et al.** provides teachings concerning sequential CVD deposition followed by plasma treatment all performed in the same chamber (abstract; figure 1; col. 4, lines 20-65+ or CVD & col. 8, lines 21-29 for RF plasma electrodes for the sequential plasma treatment as parts of the CVD chamber), hence Hautala et al. provides an exemplary modified deposition apparatus used for situations as taught by the PGPub of Lukas et al. (672), thus showing the above discussed obviousness & providing further motivation to employ such an efficient apparatus for performing procedures as suggested by the primary reference.

6. **Claims 25 & 38** are rejected under 35 U.S.C. **103(a)** as being unpatentable over **Lukas et al.** (2004/0096672 A1), optionally in view of **Hautala et al.**, as applied to claims 1, 3-10, 12 -18, 20-21, 23-24, 27-36 & 39-40 above, and further in view of **Hautala et al.** (6,268,288 B1), optionally considering **Jin et al.** ("Nanoporous Silica as an Ultralow-k Dielectric", MS bulletin 10/1997) or **Han et al.** (6,759,098 B2).

Lukas et al. (672) differs from these claims by not suggesting repeated sequences of deposition plasma exposure in order to deposit a desired thickness of either precursor film or porous dielectric film. In their background, Lukas et al. suggest the use of the low dielectric constant materials made by their techniques in the micro electronic industry such as multilayer integrated circuit devices ([0001-3]), with suggestions of use in semiconductor processing ([0081]), but the disclosed process is relatively generic to the deposition without specific enduse, or thicknesses, or the like. Hautala et al., who is analogous to the taught options of the primary reference with respect to CVD or PECVD deposition followed by plasma treatment to affect the deposit (abstract; col. 2, lines 35-48; col. 8, lines 32-47; col. 10, lines 62-col. 11, lines 5+), teach multiple iterations of deposition plasma treatment, for the advantage of good conformity (high formality), improved (uniform) microstructure through the total thickness deposited & low residual

Art Unit: 1792

impurity concentrations with sufficiently high deposition rates (abstract; col. 2, lines 25-31; col. 10, lines 54-60), hence while Lukas et al. & Hautala et al. are directed to different specific sets of chemical reactions (i.e. different depositions modified by different plasma treatments), it would've been obvious to one of ordinary skill in the art that the generally applicable advantages provided by alternating CVD deposition followed by plasma treatment, which improved the conformality of the deposit as well as ensure even removal of contaminants through the total deposited film, which in the case of Lukas et al. would have been removal of the porogens, would have been expected to provide analogous advantages to deposited films formed of low dielectric constant materials with respect to even removal of their porogens through the thickness of the film, in order to form the porous dielectric films with the analogous advantages taught by Hautala et al., than would have been reasonably expected to be possible if only a single set of steps were performed, where use of such repetitive techniques would depend on desired thicknesses, for the particular product be formed, thus provide greater flexibility in use of the general dielectric deposition techniques for making specific electronic products.

The article to Jin et al. ("Nanoporous...") is optionally considered, as it provides additional motivation for employing the techniques of Hautala et al. of alternate deposition/plasma treatment sequences, if the process of Lukas et al., in order to effect uniform plasma treatment throughout the deposited thickness, thus uniform porogen removal, as such would have been expected to produce uniform porosity throughout the thickness, which as seen in the teachings of Jin et al. (figure 1 discussed in the second full paragraph) would have been expected to affect the particular dielectric constant, hence in order to have uniform dielectric constant through the thickness at of the film, one of ordinary skill in the art would reasonably desire to have uniform porosity, thus providing a further motivation for applying techniques expected to produce such uniformity.

Alternately, Han et al. ((098): abstract; col. 4, lines 19-45; col. 6, lines 10-60 & 66-col. 7, lines 9 & 35-48) is optionally considered to provide additional motivation for multiple alternating depositions

Art Unit: 1792

with plasma curing which removes material to yield a porous film, as Han et al. teaches the option of plasma curing to reduce the amount of Si-CH<sub>3</sub> bonds to create the porous material which can optionally be further treated, such as by annealing, which may increase the elastic modules, thus affecting a type of mechanical strengthening, where it is taught that this analogously deposited & treated material may be used in an embodiment where one or more of the dielectric layers are formed in order to form a multilayer interconnect structures, thus effectively repeating steps as claimed & providing an additional reason for creating such multilayer structures, which would have been obvious to one of ordinary skill in the art to perform with the above combined teachings of Lukas et al. & Hautala et al., as it is directed to types of and uses as suggested by Lukas et al., hence would have been expected to be useful therefore.

7. **Claim 19** is rejected under 35 U.S.C. **103(a)** as being unpatentable over **Lukas et al.** (2004/0096672 A1), optionally in view of **Hautala et al.** (6,268,288 B1) ., as applied to claims 1, 3-10, 12-18, 20-21, 23-24, 27-36 & 39-40 above, and further in view of **Laxman et al.** (2002/0172766 A1).

The teachings of Lukas et al. (672), optionally considering Hautala et al., do not include suggestions of using dual RF frequency plasma reactors for the plasma exposing step, i.e. for removal of porogen, however Laxman et al. (abstract; [0093- 108, especially 93 & 98-102]; & [0127-128]), who also have teachings directed to preparation of low dielectric constant material, that may be porous, and provide for initial deposition via a CVD process which may be performed using single or dual frequency plasma activation, further teach that after deposition a step that employs alternatively heating or additional plasma activation may be employed to cleave (i.e. remove) volatile components from the deposit, where the plasma apparatus described for the deposition of Laxman et al. would appear to be overlapping in useful types as that employed for Laxman et al.'s post annealing step when plasma enhanced or assisted. Taught radiofrequency sources include radiofrequency sources of about 13.56 MHz using powers ranging from about 75-200 W, or low-frequency (about 350 kHz) sources with power ranging from 5-75 W, or combinations thereof. Given the analogous, but generic, deposition & porogen removal techniques of the

Art Unit: 1792

primary reference generally inclusive of plasma techniques, it would've been obvious to one of ordinary skill in the art to employ any plasma techniques shown to have been useful for analogous removal processes, such as the dual frequency techniques that are suggested by the teachings of Laxman et al., where it would've been further obvious for one of ordinary skill in the art to perform routine experimentation in order to determine the particular parameters most favorable for the specific materials being deposited & treated via plasma, where one of ordinary skill would recognize that the particular chamber & its characteristics will further affect parameters employed, particularly noting that since Laxman et al. discusses power without providing information concerning area over which that power is applied, hence routine experimentation would have been expected to be necessary in order to determine useful parameter values for a specific plasma apparatus configuration.

8. Additional references that are noted to be of interest include: Nguyen et al. (2008/0132055 A1 & 7381659 B2), and Dubois et al. (2008/0009141 A1), which well directed to relevance subject matter, are not prior art.

As previously noted, other art particularly of interest included Albano et al. (2002/0106500 A1), who are also making low dielectric constant porous materials with improved elastic modulus & film hardness through the use of postdeposition treatments of plasma, optionally followed by UV, however this publication indicates that these treatments are applied to material that is already porous, and there's no discussion in Albano et al. (500) concerning either the plasma or the subsequent UV treatment removing any materials equivalent of porogens, however these teachings to provide cumulative evidence of sequential treatments improving mechanical strength and structure of porous dielectric films.

The article to Cho et al. ("Plasma Treatments of Molecularly Templated Nanopores Silica Films") cited by applicants is of interest for spin coating precursors for nanoporous silica films, where oxygen plasma in an plasma enhanced cluster system is employed at 300°C for three minutes to remove organic

Art Unit: 1792

templates and form the nano porosity, however this reference does not appear to employ a sequential UV treatment.

The patent is to Berry et al. (6,558,755 B2 & 6,576,300 B1) have teachings concerning plasma treating a deposit coding to convert it to a porous silica, followed by a sequential treatment (annealing) that improves properties (elastic modulus) of the initial porous coating, thus overlapping with teachings of Lukas et al. & Hahn et al. applied above & relevant to present claims where the type of specific treatment in the second chamber is not specified.

Other art containing teachings of interest concerning Dole frequency plasma is used with low dielectric constant material processing include shy oh et al. (6479409 B2; see table 1 & conditions listings and cols. 10, 11, 13); Zheng et al. ((2004/0101633 A1); [0020-21]); Hendriks et al. (6,740,602 B1; col.s 8-9); & Chang et al. (6921727 B2; col. 7).

9. **Claims 1, 3-10, 12-25, 27-36 & 38-40** are rejected under 35 U.S.C. **112**, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

While the examiner finds support for further removal of porogen due to a subsequent treatment inclusive of UV or EB, as set forth on page 19, particularly second & third full paragraphs, plus original claims 2 & 37, the examiner did not find any disclosure that necessitated that the additional removal of porogen created increased porosity, only increased mechanical strength. While it would not be unexpected that removing additional porogen, which additional removal caused porosity of the film, would increase the porosity, the examiner found oh disclosure in the specification that necessitated that the porosity be increased by the additional treatment as presently claimed, hence unless evidence to the contrary can be presented, it appears that this particular new requirement of "increasing the porosity" in the amended claims requires a limitation that is not necessitated by the original disclosure, hence may be

Art Unit: 1792

considered **New Matter**. It is noted that while a results of a step may be an obvious option, dependent on various parameters & materials employed, if it cannot be shown that such a results is necessarily encompassed or contemplated by the original specification, it cannot be claimed as a requirement in the claims without resulting new matter.

10. Applicant's arguments filed **3/28/2008 & discussed above** have been fully considered but they are not persuasive.

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Marianne L. Padgett whose telephone number is (571) 272-1425. The examiner can normally be reached on M-F from about 8:30 a.m. to 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks, can be reached at (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained

Art Unit: 1792

from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Marianne L. Padgett/  
Primary Examiner, Art Unit 1792

MLP/dictation software

7/7/2008